Jialin Li

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Education

University of Illinois Urbana-Champaign — Champaign, United States
Ph.D. Mechanical Engineering — since Aug 2024
ETH Zurich — Zurich, Switzerland
MSc. Robotics, Systems, and Control (with distinction) — Sept 2021 - Sept 2024
University of Science and Technology of China — Hefei, China
BSc. Theoretical and Applied Mechanics (*summa cum laude*) — Sept 2017 - Jul 2021

Research Interests

My research focuses on uncertainty quantification and self-improvement of embodied foundation models and robot learning systems. I am particularly interested in enabling robots to (1) assess the limits of their competence, (2) autonomously select high-value data from physical interaction, and (3) continually improve from actively acquired experience, safely and at scale.

Publications

Safe Time-Varying Optimization based on Gaussian Processes with Spatio-Temporal Kernel
Jialin Li, Marta Zagorowska, Giulia De Pasquale, Alisa Rupenyan, John Lygeros
NeurIPS, 2024. [Paper]

Research Experiences

Ph.D. Student, University of Illinois Urbana-Champaign, advised by Prof. Naira Hovakimyan — Since Aug 2024

- Developed an L1-inspired adaptive action-compensation method for robustifying Decision Transformer policies under disturbances.
- Studying the interaction between adaptive compensation and safe exploration under model uncertainty.

Research Intern, Bosch Center for Artificial Intelligence — Feb 2024 - Jul 2024
Motion Planning for Robotic Manipulation — Advisor: Dr. Hadi Beik-Mohammadi and Dr. Leonel Rozo

- Developed a contractive motion-planning approach for robotic manipulation using injective flow models.

Research Assistant, Automatic Control Lab, ETH Zurich — Jan 2024 - May 2024

- Enriched theoretical and empirical results of TVSafeOPT — Advisor: Prof. Dr. John Lygeros
- Accepted by *NeurIPS* 2024

Master Thesis, Automatic Control Lab, ETH Zurich — Apr 2023 - Nov 2023
Time-Varying Safe Bayesian Optimization — Advisor: Prof. Dr. John Lygeros

- Proposed Event-Triggered StageOPT (ET-StageOPT) algorithm to safely handle time-varying objective;
- Proposed Approximate Time-Varying SafeOPT (A-TVSafeOPT) algorithm to safely and continuously handle time-varying objective and constraints;
- Provided safety and near-optimality guarantees for A-TVSafeOPT;
- Validated effectiveness of both algorithms in simulation.

Research Assistant, USTC Robotics Lab, University of Science and Technology of China — Mar 2019 - Feb 2020
Mechanics Modeling of a Soft Robotic Gripper Augmented by Transfer Learning — Advisor: Prof. Jianmin Ji

- Derived the approximate moment balance equation for each flexure joint with large deformation;
- Tuned joint stiffness using experimental data with transfer learning to compensate for model mismatch;
- Successfully utilized the soft robotic gripper to grasp fragile objects like tofu with the augmented model.

Projects

Robotic Systems Lab, ETH Zurich — Sept 2022 – Jan 2023
Semester Project: **Collision Avoidance for an Object Manipulation Scenario**

- Implemented additional cost terms in the MPC controller to avoid object-robot and object-environment collision;
- Wrote an active perception package for the ALMA robot to update the URDF of the manipulated object;
- Tested the perception and object collision avoidance module in simulation.

Laboratory for Intelligent Decision and Autonomous Robots, Georgia Tech — Jun 2020 – Aug 2020

Research Assistant: **Solution and Simulation of the Humanoid Inverse Kinematics**

- Derived and implemented a geometric IK solution for the bipedal robot Cassie;
- Implemented Jacobian pseudoinverse IK for arms of the upper body humanoid Athena;
- Simulated the whole-body IK for the Athena-Cassie humanoid in Drake.

University of Science and Technology of China May 2019 - Oct 2019
Robot Summer School: **Design of a Robot for "Rescue over Challenging Terrain"**

- Designed the mechanical structure of a wheeled robot capable of traversing obstacles and climbing slopes;
- Guaranteed the mechanical design's safety with knowledge of mechanics.

SELECTED HONORS AND AWARDS

- ETH Scholarship 2022
- Guo Moruo Scholarship (the highest honor for undergraduates at USTC) [Link] 2020
- Scholarship for Outstanding Students, Gold Award 2019
- National Scholarship 2018

SERVICES

- **Reviewer**: ICML, RA-L, L4DC
- **TA**: UIUC ME 340 Dynamics of Mechanical Systems 2024-2025
- **TA**: ETHz Probabilistic Artificial Intelligence [Link] 2022

SKILLS

- Programming: Python, C++, Linux, MATLAB, LaTeX, HTML
- Frameworks: PyTorch, JAX, GPyTorch, GPy, NumPy, Git, ROS, Drake
- Robots: Panda Arm, ALMA (ANYmal with arm), Cassie